



**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2021-0831; Project Identifier AD-2021-00712-E; Amendment 39-21933; AD 2022-03-16]**

**RIN 2120-AA64**

**Airworthiness Directives; General Electric Company Turbofan Engines**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for certain General Electric Company (GE) GEnx-1B and GEnx-2B model turbofan engines. This AD was prompted by the manufacturer's report of two findings of sheared compressor discharge pressure (CDP) bolts during engine shop visits. This AD requires initial and repetitive inspections of the CDP bolted joint and, depending on the findings, a piece part inspection of the stages 6-10 compressor rotor spool, CDP seal, and high-pressure turbine (HPT) rotor stage 1 disk. As a terminating action, this AD requires operators to reassemble the CDP bolted joint using a specific torque wrench. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** For service information identified in this final rule, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: [aviation.fleetsupport@ae.ge.com](mailto:aviation.fleetsupport@ae.ge.com); website: [www.ge.com](http://www.ge.com). You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the

availability of this material at the FAA, call (817) 222-5110. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0831.

### **Examining the AD Docket**

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0831; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; fax: (781) 238-7199; email: [Alexei.T.Marqueen@faa.gov](mailto:Alexei.T.Marqueen@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Background**

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain GE GEnx-1B and GEnx-2B model turbofan engines. The NPRM published in the *Federal Register* on October 28, 2021 (86 FR 59667). The NPRM was prompted by a report from the manufacturer of two findings of sheared CDP bolts at engine shop visits during disassembly of the CDP bolted joint on GEnx-1B70/75/P2 and GEnx-2B67/P model turbofan engines. Subsequent investigation by the manufacturer determined that the fracture and liberation of the CDP bolts was caused by the inadvertent over-torque condition of the bolts during assembly and reassembly with a 11C4525P01 torque fixture or during assembly with a 11C4629P01 torque wrench. In one finding, the fractured CDP bolt caused damage to the stages 6-10 compressor rotor spool, CDP seal, and HPT rotor stage 1 disk. In the NPRM, the FAA proposed to require initial and repetitive inspections of the CDP bolted joint and, depending on the findings, a piece part inspection of the stages 6-10 compressor rotor spool, CDP seal, and HPT rotor stage 1 disk. As a terminating action, the NPRM also proposed to require operators to reassemble the CDP bolted joint using a 11C4888P01

torque wrench. The FAA is issuing this AD to address the unsafe condition on these products.

## **Discussion of Final Airworthiness Directive**

### **Comments**

The FAA received comments from four commenters. The commenters were American Airlines (American), The Boeing Company (Boeing), GE Aviation, and United Airlines Engineering (UAL Engineering). The following presents the comments received on the NPRM and the FAA's response to each comment.

### **Request to Add Engine Serial Numbers to Applicability Paragraph**

American requested that the FAA clarify paragraph (c), Applicability, by adding the affected engine serial numbers (S/Ns). American explained that operators do not have visibility to the engines that were assembled or reassembled by GE with the 11C4525P01 torque fixture, or engines that were assembled with the 11C4629P01 torque wrench. American noted that due to this lack of visibility, operators will need to rely on GE to provide the affected engine S/Ns, either in GENx-1B Service Bulletin (SB) 72-0495 R00, dated May 11, 2021 (GENx-1B SB 72-0495) or in response to an inquiry, which would place an excessive burden on the operators.

The FAA disagrees with adding engine S/Ns to the Applicability paragraph of this AD. According to GE, each maintenance, repair and overhaul (MRO) shop will have a record of what date the new 11C4888P01 torque wrench was implemented for use, and any CDP bolted joint reassembled at an engine shop visit prior to that implementation date would have used the prior 11C4525P01 torque fixture. Thus, for engines that have had an engine shop visit, each operator will be able to determine if their engine is affected based on the date of the last engine shop visit and the date that the particular MRO shop implemented the new tool. For engines that have not had an engine shop visit, Paragraph 1.A, Table A of GENx-1B SB 72-0495 and Paragraph 1.A, Table A of GE GENx-2B SB 72-0433 R00, dated May 11, 2021 define which engine S/Ns are affected based on production records.

### **Request to Add Clarifying Language to Required Actions**

GE Aviation requested that the FAA update the language in paragraph (g)(2) of this AD to incorporate a reference to the terminating action contained in paragraph (h) of this AD. GE supported its request for change by explaining the additional reference will ensure clear understanding of the requirements.

The FAA disagrees with updating paragraph (g)(2) of this AD to incorporate a reference to the terminating action in paragraph (h) of this AD. Referencing paragraph (h) within paragraph (g)(2) is unnecessary.

#### **Request to Add Language Requiring Accomplishment of Terminating Action**

UAL Engineering requested that the FAA incorporate the terminating action in paragraph (h) of this AD as a requirement in paragraph (g)(3) of this AD. UAL Engineering explained that requiring the terminating action within paragraph (g)(3) of this AD would eliminate any ambiguity involving the reassembly of the CDP bolted joint, which could potentially lead to the use of a non-conforming tool and additional repetitive inspections.

The FAA disagrees with revising the required action as proposed by UAL Engineering. MRO shops no longer use the 11C4525P01 torque fixture. All MRO shops have implemented the use of the updated 11C4888P01 torque wrench. Therefore, if a piece part inspection is required pursuant to paragraph (g)(3) of this AD, the CDP bolted joint will be reassembled with the updated 11C4888P01 torque wrench. The non-conforming tool will not be used, and therefore will not drive any additional repetitive inspections after a reassembly is performed following a piece part inspection.

#### **Support for the AD**

Boeing expressed support for the AD as written.

#### **Conclusion**

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

## **Related Service Information under 1 CFR Part 51**

The FAA reviewed GE GEnx-1B SB 72-0495 R00, dated May 11, 2021 (GE GEnx-1B SB 72-0495) and GE GEnx-2B SB 72-0433 R00, dated May 11, 2021 (GEnx-2B SB 72-0433). GEnx-1B SB 72-0495 describes procedures for the inspection of the CDP bolted joint components on GEnx-1B model turbofan engines. GEnx-2B SB 72-0433 describes procedures for the inspection of the CDP bolted joint components on GEnx-2B model turbofan engines. This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in ADDRESSES.

## **Costs of Compliance**

The FAA estimates that this AD affects 320 engines installed on airplanes of U.S. registry.

The FAA estimates the following costs to comply with this AD:

### **Estimated costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
Inspection of CDP bolted joint	1 work-hour x \$85 per hour = \$85	\$0	\$85	\$27,200

The FAA estimates the following costs to do any necessary additional inspections that would be required based on the results of the proposed inspection. The agency has no way of determining the number of aircraft that might need these inspections.

### **On-condition costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>
Piece part inspection of stages 6-10 compressor rotor spool	56 work-hours x \$85 per hour = \$4,760	\$0	\$4,760
Piece part inspection of CPD seal	22 work-hours x \$85 per hour = \$1,870	\$0	\$1,870
Piece part inspection of HPT rotor stage 1 disk	59 work-hours x \$85 per hour = \$5,015	\$0	\$5,015

## **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

## **Regulatory Findings**

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

## **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

## **The Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

### **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by adding the following new airworthiness directive:  
**2022-03-16 General Electric Company:** Amendment 39-21933; Docket No. FAA-2021-0831; Project Identifier AD-2021-00712-E.

#### **(a) Effective Date**

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

#### **(b) Affected ADs**

None.

#### **(c) Applicability**

This AD applies to General Electric Company (GE) GEnx-1B64, GEnx-1B64/P1, GEnx-1B64/P2, GEnx-1B67, GEnx-1B67/P1, GEnx-1B67/P2, GEnx-1B70, GEnx-1B70/75/P1, GEnx-1B70/75/P2, GEnx-1B70/P1, GEnx-1B70/P2, GEnx-1B70C/P1, GEnx-1B70C/P2, GEnx-1B74/75/P1, GEnx-1B74/75/P2, GEnx-1B76/P2, GEnx-1B76A/P2, GEnx-2B67, GEnx-2B67B, and GEnx-2B67/P model turbofan engines with a compressor discharge pressure (CDP) bolted joint assembled or reassembled with the 11C4525P01 torque fixture or assembled with the 11C4629P01 torque wrench.

#### **(d) Subject**

Joint Aircraft System Component (JASC) Code 7250, Turbine Section.

#### **(e) Unsafe Condition**

This AD was prompted by a report from the manufacturer of two findings of sheared CDP bolts during engine shop visits. The FAA is issuing this AD to prevent fracture of the CDP bolt. The unsafe condition, if not addressed, could result in damage to the engine and damage to the airplane.

#### **(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

#### **(g) Required Actions**

(1) At the next engine shop visit after the effective date of this AD, perform an inspection of the CDP bolted joint for fractured or missing material using the Accomplishment Instructions, paragraph 3.A.(2) of GE GEnx-1B Service Bulletin (SB)

72-0495 R00, dated May 11, 2021 (GENx-1B SB 72-0495) (for GENx-1B models) or Accomplishment Instructions, paragraph 3.A.(2) of GE GENx-2B SB 72-0433 R00, dated May 11, 2021, (GENx-2B SB 72-0433) (for GENx-2B models).

(2) Repeat the inspection required by paragraph (g)(1) of this AD at every engine shop visit.

(3) If a fractured or missing bolt or nut is found during any inspection required by paragraph (g)(1) or (2) of this AD, before further flight, perform piece part inspections of the stages 6-10 compressor rotor spool, CDP seal, and high-pressure turbine rotor stage 1 disk in accordance with the Instructions for Continued Airworthiness.

#### **(h) Terminating Action**

As terminating action to the repetitive inspections required by paragraph (g)(2) of this AD, reassemble the CDP bolted joint using the 11C4888P01 torque wrench, in accordance with the Accomplishment Instructions, paragraph 3.B.(1) of GENx-1B SB 72-0495 (for GENx-1B models) or the Accomplishment Instructions, paragraph 3.B.(1) of GENx-2B SB 72-0433 (for GENx-2B models).

#### **(i) Definition**

For the purpose of this AD, an “engine shop visit” is the induction of an engine into the shop for maintenance involving a module exposure in which the mid fan shaft removal exposes the CDP bolted joint.

#### **(j) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the ECO Branch, send it to the attention of the person identified in paragraph (k) of this AD. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.



**(k) Related Information**

For more information about this AD, contact Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; fax: (781) 238-7199; email: Alexei.T.Marqueen@faa.gov.

**(l) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) General Electric Company (GE) GEnx-1B Service Bulletin (SB) 72-0495 R00, dated May 11, 2021.

(ii) GE GEnx-2B SB 72-0433 R00, dated May 11, 2021.

(3) For GE service information identified in this AD, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: aviation.fleetsupport@ae.ge.com; website: www.ge.com.

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: fr.inspection@nara.gov, or go to: <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued on January 25, 2022.

Lance T. Gant, Director,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

[FR Doc. 2022-03040 Filed: 2/11/2022 8:45 am; Publication Date: 2/14/2022]